

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

**Norman C. Fawley**

Application No.: 10/695,252

Filed: October 27, 2003

For: **METHOD FOR BENDING COMPOSITE  
REINFORCED PIPE**

Art Group: 1732

Examiner: Patrick Butler

**APPEAL BRIEF**

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Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

Applicant (hereinafter "Appellant") submits one copy of the following Appeal Brief pursuant to 37 C.F.R. § 41.37 for consideration by the Board of Patent Appeals and Interferences. Appellant also submits herewith a check in the amount of \$500.00 to cover the cost of filing the opening brief as required by 37 C.F.R. § 41.20(b)(2). Please charge any additional amount due or credit any overpayment to deposit Account No. 02-2666.

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**I. REAL PARTY INTEREST**

Norman C. Fawley, inventor of the subject application, assigned his rights to the invention disclosed in the subject application through an Assignment recorded on December 14, 2004, at reel and frame 016085/0088 to NCF Industries, Inc., 807-C Main Street, Santa Maria, California, 93458. Therefore, NCF Industries, Inc. is the real party in interest.

**II. RELATED APPEALS AND INTERFERENCES**

There are no other appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in this Appeal.

**III. STATUS OF CLAIMS**

Claims 1-10 are pending in the application. Claims 11-16 are withdrawn. No claims are allowed, no claims are amended and no claims are cancelled. Claims 1-5 and 7-10 stand rejected. Therefore, Appellant appeals the rejection of claims 1-5 and 7-10.

**IV. STATUS OF AMENDMENTS**

No amendments were filed subsequent to the final rejection.

**V. SUMMARY OF CLAIMED SUBJECT MATTER**

Independent claim 1 recites a method of bending Composite Reinforced Pipe (CRP) (application, p. 1, ¶ 1, lines 9-11; Figure 1).. The method includes placing a heater (application, p. 3, ¶ 12, lines 34-35; Figure 1 reference no. 30) proximate to a longitudinal location along the pipe (application, p. 3, ¶ 12, lines 34-35; Figure 1 reference no. 12) where the pipe is to be bent. The method further includes heating the pipe (application, p. 4, ¶ 12, lines 3-4; Figure 1) and bending the pipe at the longitudinal location (application, p. 4, ¶ 12, lines 4-16; Figure 1).

Dependent claim 2 recites the element of wherein the pipe is heated such that a composite temperature is slightly below a heat distortion temperature of the composite. See application, p. 4, ¶ 12, lines 1-2.

Dependent claim 5 recites the element of wherein the longitudinally displaced locations are separated by a distance equal to approximately 1/4 of a diameter of the pipe. See application, p. 4, ¶ 12, lines 7-11.

Dependent claim 8 recites the element of capping the pipe to prevent heat loss. See application, p. 4, ¶ 13, lines 18-22.

Dependent claim 9 recites the element of wherein the heater is an induction heater. See application, p. 3, ¶ 12, lines 34-36; Figure 1, reference no. 12.

Dependent claim 10 recites the element of preheating by introducing hot air into the CRP. See application, p. 4, ¶ 12, lines 11-12.

## **VI. GROUND'S OF REJECTION TO BE REVIEWED ON APPEAL**

The issues involved in this Appeal are as follows:

A. Whether claims 1-4 and 7 are anticipated under 35 U.S.C §102 by U.S. Patent No. 4,132,104 issued to Clavin ("Clavin").

B. Whether claim 5 is obvious under 35 U.S.C §103 over Clavin in view of European Patent Application 1086760 A2 issued to Lewis ("Lewis").

C. Whether claims 8 and 10 are obvious under 35 U.S.C §103 over Clavin in view of U.S. Patent No. 4,255,378 issued to Miller et al. ("Miller").

D. Whether claim 9 is obvious under 35 U.S.C §103 over Clavin in view of U.S. Patent No. 2,480,774 issued to Rossheim et al. ("Rossheim").

All of the claims do not stand or fall together. The basis for the separate patentability of the claims is set forth below.

## **VII. ARGUMENT**

In the outstanding Final Office Action ("Final Action") the Examiner rejects claims 1-4 and 7 under 35 U.S.C §102 as being anticipated by Clavin, claim 5 under 35 U.S.C §103 as

obvious over Clavin in view of Lewis, claims 8 and 10 under 35 U.S.C §103 as obvious over Clavin in view of Miller and claim 9 under 35 U.S.C §103 as obvious over Clavin in view of Rossheim. Appellant respectfully submits for at least the following reasons, claims 1-10 are patentable over the prior art.

#### **A. Overview of the Prior Art**

##### **1. Overview of Clavin**

Clavin generally discloses a method and apparatus for bending coated pipe and heating of sections of the pipe coating by resistance heating to prevent damage to the pipe coating during bending of the pipe. See Clavin, Abstract. Clavin discloses that the pipe coating may be formed of a uniform continuous layer of plastic or resin. See Clavin, col. 3, lines 53-55. Clavin discloses that the heater may be a single sheet-like element or made up of a plurality of strips interconnected by conductors. See Clavin, col. 3, lines 60-65. The sheet-like element or strips are positioned along sections of the coating overlying the pipe to heat the coating by inserting them within a recess along an upper surface of a strongback which extends along a length of the pipe. See Clavin, col. 3, lines 5-40. Thus, the heating element is sandwiched between a portion of the pipe and strongback. A bending die is further positioned along a side of the pipe opposite the strongback to facilitate bending. See Clavin, Figure 1. The pipe is then bent by rotating the strongback with the heating element therein. See Clavin, Figure 1.

Clavin fails to disclose a method of bending composite reinforced pipe by heating the pipe.

##### **2. Overview of Lewis**

Lewis generally discloses a pipe bending system including a feedback and control system that provides continuous data to a programmed processor. See Lewis, Abstract. The system includes a conventional pipe bender and an apparatus for axially moving the pipe with respect to the pipe bender. See Lewis, col. 4, paragraph [0016]. The system further includes an encoder to provide an electrical signal corresponding to the linear distance the pipe has moved. See Lewis, col. 4, paragraph [0018]. The system further includes a processor to carry out bending parameters. See Lewis, col. 12, paragraph [0038].

Lewis fails to disclose a method of bending a composite reinforced pipe including bending the pipe at longitudinally displaced locations separated by a distance equal to approximately  $\frac{1}{4}$  of a diameter of the pipe.

### **3. Overview of Miller**

Miller generally discloses a process and jig for field bending of large diameter plastic pipes. See Miller, Abstract. The jig includes adjustable left and right hand guide assemblies along a spreader tube. See Miller, Abstract. A plastic pipe may be inserted through the guide assemblies. See Miller, Figure 1. To form a bend in the pipe, plugs are placed at the ends of the pipe so that pressurized air is trapped within the pipe when heat is applied to prevent the wall from buckling upon formation of the bend. See Miller, col. 5, lines 25-29.

Miller fails to disclose a method of bending a composite reinforced pipe including introducing hot air into the pipe to preheat the pipe and capping ends of the pipe to prevent heat loss and.

### **4. Overview of Rossheim**

Rossheim generally discloses a method of bending thermoplastic tubes. See Rossheim, col. 1, lines 20-25. Rossheim teaches the application of heat at high temperature levels to an area to be bent. See Rossheim, col. 7, lines 1-35.

Rossheim fails to disclose a method of bending a composite reinforced pipe including heating the composite reinforced pipe using an induction heater.

### **B. Rejection of Claims 1, 3, 4 and 7 Under 35 U.S.C. §102**

In the outstanding Final Action, the Examiner rejects claims 1, 3, 4 and 7 under 35 U.S.C. § 102(b) as being anticipated by Clavin.

It is axiomatic to a finding of anticipation that each and every element of the rejected claim be disclosed within a single prior art reference.

With respect to claim 1, Appellant respectfully submits that Clavin fails to teach “[a] method of bending a Composite Reinforced Pipe (CRF)” including the element of “heating the pipe” as recited in claim 1.

The Examiner alleges “applying a material to a pipe” as recited in col. 4, lines 43-59 of Clavin teaches a composite reinforced pipe and further that col. 1, line 57-col. 2, line 5 and Figure 1 teach heating the pipe prior to bending. See Final Action, page 2. The Examiner alleges that merely applying a material to a pipe teaches a composite reinforced pipe because a composite is something made up of distinct parts and the coating reinforces the underlying pipe. See Final Action, page 2. In reaching this conclusion, Appellant believes the Examiner misinterprets the phrase composite reinforcement as it is used in the context of the instant application and claims.

As provided in col. 3, lines 52-54 of Clavin, the coating disclosed in Clavin is a “uniform continuous layer of plastic or resin.” As the phrase “composite reinforced pipe” suggests, however, and as further provided in Appellant’s specification, a composite reinforcement in this context refers to a type of coating applied to the pipe. Specifically, a composite made up of a combination of materials which provide reinforcement to the underlying pipe, such as, for example fiberglass-reinforced resins. See Application, page 4, paragraph [0014]. Thus, it is the combination of a resin and a reinforcement material (e.g. fiberglass) that form a composite reinforcement which reinforces the underlying pipe when placed thereon. Accordingly, neither a plastic coating alone nor a plastic coated pipe may be characterized as a composite reinforcement as alleged by the Examiner. Thus, for at least the foregoing reasons Clavin fails to teach a method of bending composite reinforced pipe as recited in claim 1.

Moreover, col. 1, line 57-col. 2, line 5 of Clavin fails to teach heating of the pipe prior to bending as alleged by the Examiner. See Final Action, page 2. Instead, this portion of Clavin teaches that “the *pipe coating at the outside of the bend is heated directly* by resistance heating apparatus disposed at a specific area” (emphasis added). The coating is heated by the resistance heating apparatus to a temperature which will allow the coating to be stretched during bending of the pipe. See Clavin, col. 3, lines 33-40. A direct heating method for a coating such as that disclosed in Clavin does not teach the method of bending recited in claim 1 wherein *the pipe is heated*.

Thus, for at least the foregoing reasons, Clavin fails to teach a method of bending a composite reinforced pipe wherein the pipe is heated as recited in claim 1. Since each and every element of the claim is not taught by the reference, anticipation may not be found. In view of the foregoing, Appellant respectfully submits claim 1 and its dependent claims 3, 4 and 7 are patentable over Clavin and requests the rejection of claims 1, 3, 4 and 7 under 35 U.S.C. §102(b) as being anticipated by Clavin be overturned.

**C. Rejection of Claim 2 Under 35 U.S.C. §102**

In the outstanding Final Action, the Examiner rejects claim 2 under 35 U.S.C. § 102(b) as being anticipated by Clavin.

In regard to dependent claim 2, claim 2 depends from claim 1 and incorporates the limitations thereof. Thus, for at least the reasons discussed in regard to claim 1, Clavin fails to anticipate Claim 2.

In addition, the failure of Clavin to teach a CRP and heating the pipe as recited in claim 1 necessarily prevents Clavin from teaching the element of “wherein the pipe is heated such that a composite temperature is slightly below a heat distortion temperature of the composite” as further recited in claim 2.

The Examiner alleges Clavin discloses a heating temperature which softens the coating without destroying it in col. 4, lines 65-col. 5, line 2 and therefore teaches this element. See Final Action, page 6. This portion of Clavin generally discloses that a preferred heating temperature will be in a range where the coating is softened without deforming or destroying the coating. See Clavin, col. 4, lines 65-68. This portion of Clavin does not specifically disclose what the preferred temperature range is.

It is well known that a heat distortion temperature of a material refers to a temperature at which the material deforms under a specific load and is determined by standardized testing procedures. Thus, the heat distortion temperature of a material is specific to that material and is determined by more than a mere softening of the material. Accordingly, an undisclosed temperature range which softens a plastic does not teach a temperature below a heat distortion temperature of a composite as required by claim 2. Moreover, Clavin teaches heating the coating

directly. Thus, Clavin further fails to teach heating a composite *via an underlying pipe* to a temperature below a heat distortion temperature of the composite as recited in claim 2.

Since Clavin fails to teach at least this additional element of claim 2, anticipation may not be established. For at least the foregoing reasons, Appellant respectfully submits claim 2 is separately patentable over the prior art and requests the rejection of claim 2 under 35 U.S.C. §102(b) as being anticipated by Clavin be overturned.

**D. Rejection of Claim 5 Under 35 U.S.C. §103**

In the outstanding Final Action, the Examiner rejects claim 5 under 35 U.S.C. § 103(a) as being unpatentable over Clavin and further in view of Lewis.

To establish a *prima facie* case of obviousness, the Examiner must show that the cited references, combined, teach or suggest the claimed combination of elements or identify an apparent reason to combine prior art elements in the manner claimed.

Claim 5 depends from claim 1 and incorporates the limitations thereof. As previously discussed in regard to claim 1, Clavin fails to teach at least the elements of a composite reinforced pipe and heating the pipe as further found in claim 5. The Examiner has further not pointed to, and Appellant is unable to discern, a portion of Clavin or Lewis teaching or suggesting or providing any apparent reason for these elements.

Claim 5 is further not obvious over Clavin in view of Lewis for at least the reasons that Clavin and Lewis fail to teach or suggest or provide any apparent reason for the element of “wherein the longitudinally displaced locations are separated by a distance equal to approximately 1/4 of a diameter of the pipe” as further recited in claim 5.

The Examiner alleges Clavin teaches 1 degree bends achieved in an arc distance equal to a pipe’s diameter and Lewis discloses spaced ¼ degree bends. See Final Action, page 3. The Examiner alleges the foregoing disclosures teach spaced ¼ degree bends which are ¼ of the 1 degree arc length and therefore meet the limitations of claim 5. See Final Action, page 3. Appellant respectfully disagrees.

In particular, although Clavin discloses bending the pipe 1 degree per arc foot in col. 5, a mere teaching of a pipe bend degree per arc foot does not disclose longitudinally spacing the bends along the pipe based on a diameter of the pipe. Similarly, the portion of Lewis relied upon by the Examiner describes over bending of the pipe to ½ degree instead of ¼ degree to achieve a ¼ degree bend once the pipe is relaxed, not spacing bends along the pipe. See Lewis, col. 9, paragraph [0029]. Thus, these portions of Clavin and Lewis are concerned with the angle of the pipe bend, not where the bend is positioned along the pipe with respect to a pipe diameter. The degree of bend is not what is recited in claim 5. Rather claim 5 specifies that the distance between longitudinally displaced locations along the pipe is ¼ of a diameter of the pipe. Accordingly, for at least these additional reasons the Examiner fails to identify a portion of either Clavin or Lewis contemplating or providing any apparent reason for separating longitudinally displaced locations for bending of the pipe by a distance equal to approximately ¼ of a diameter of the pipe.

Since Clavin and Lewis, alone or in combination, fail to teach or suggest or provide any apparent reason for each and every element of claim 5, a *prima facie* case of obviousness may not be found. For at least the foregoing reasons, Appellant respectfully submits claim 5 is separately patentable over the prior art and requests the rejection of claim 5 under 35 U.S.C. §103 as obvious over Clavin and Lewis be overturned.

**E. Rejection of Claims 8 and 10 Under 35 U.S.C. §103**

In the outstanding Final Action, the Examiner rejects claims 8 and 10 under 35 U.S.C. § 103(a) as being unpatentable over Clavin and further in view of Miller.

Claims 8 and 10 depend from claim 1 and incorporate the limitations thereof. As previously discussed in regard to claim 1, Clavin fails to teach or suggest or provide any apparent reason for at least the elements of a CRP and heating the pipe as further required by claims 8 and 10. The Examiner has further not pointed to, and Appellant is unable to discern a portion of Miller curing the deficiencies of Clavin with respect to the claimed combination of elements.

In addition, there is no reason to modify Clavin in view of Miller to include the elements of “capping the pipe to prevent heat loss” (claim 8) and preheating the pipe by “introducing hot

air into the CRP” (claim 10). As previously discussed, Clavin discloses a technique for bending a *metal* pipe without tearing a coating by *directly* heating the coating. Clavin does not contemplate *heating the pipe* prior to bending of the pipe as a way to prevent tearing of the coating much less a desire to retain heat within the pipe.

Miller discloses a process for bending a *plastic* pipe wherein air is retained within the pipe using plugs at each end *so that pressurized air is trapped within the pipe to prevent pipe buckling during bending*. See Miller, col. 5, lines 22-29.

Nowhere within Miller is it contemplated that the trapped air facilitates heating of a coating or prevents tearing of an outer coating during bending of the pipe. Moreover, the reason for trapping pressurized air using plugs as disclosed in Miller (i.e. prevent buckling of plastic pipe during bending) is entirely absent in Clavin. In particular, Clavin discloses a metal pipe. One of ordinary skill in the art would not understand trapping of pressurized air within a metal pipe to have any particular advantage with respect to pipe buckling. Accordingly, one of ordinary skill in the art would not understand any reason to introduce hot air into the metal pipe of Clavin or cap off the pipe ends to prevent heat loss.

Thus, for at least the foregoing reasons, the combination of Clavin and Miller may not be relied upon to teach or suggest or provide any apparent reason for each and every element of claims 8 and 10. Since each element of the claims are not provided by the references, a *prima facie* case of obviousness may not be found. For at least the foregoing reasons, Appellant respectfully submits claims 8 and 10 are patentable over the prior art and requests the rejection of claims 8 and 10 under 35 U.S.C. § 103 as obvious over Clavin and Miller be overturned.

#### **F. Rejection of Claim 9 Under 35 U.S.C. §103**

In the outstanding Final Action, the Examiner rejects claim 9 under 35 U.S.C. § 103(a) as being unpatentable over Clavin and further in view of Rossheim.

Claim 9 depends from claim 1 and incorporates the limitations thereof. As previously discussed in regard to claim 1, Clavin fails to teach or suggest or provide any apparent reason for at least the elements of a CRP and heating the pipe as further required by claim 9. The Examiner

has further not pointed to, and Appellant is unable to discern a portion of Rossheim disclosing or providing any apparent reason for at least the element of a CRP.

In addition, the combination of Clavin and Rossheim may not be relied upon to teach or suggest or provide any apparent reason for at least the element of “an induction heater” as further recited in claim 9. The Examiner alleges it would be obvious to incorporate an induction heater such as that of Rossheim into Clavin because both resistance and induction heaters are capable of heating a pipe to be bent. See Final Action, page 5.

As can be seen from Figures 1 and 4 of Rossheim, the disclosed heaters are relatively bulky devices which include ring like openings through which the pipe can be inserted for heating. In contrast, the heating element of Clavin is a thin sheet like strip designed to be inserted within a recess along an upper surface of a strongback which extends along a length of the pipe. See Clavin, col. 3, lines 5-40. Thus, the heating element is sandwiched between a portion of the pipe and strongback. A bending die is further positioned along a side of the pipe opposite the strongback to facilitate bending. See Clavin, Figure 1. The pipe is then bent by rotating the strongback with the heating element therein. See Clavin, Figure 1. In this aspect, heating of the coating and bending of the pipe occur simultaneously thereby preventing tearing of the coating.

Due to the size and configuration of the heating devices disclosed in Rossheim, the bending system of Clavin would need to be substantially modified and bending of the pipe while heating the coating within the bend as provided by the system in Clavin could not be achieved. In particular, since the heating element of Rossheim encircles the pipe, if it were used in Clavin it would need to be placed on either side of the strongback and could no longer be positioned along a pipe section within the bending apparatus. Thus, it would be uniquely challenging and would frustrate the purpose of Clavin to incorporate the heating devices of Rossheim into Clavin. Accordingly, for at least the foregoing reasons, the combination of Clavin and Rossheim may not be relied upon to teach or suggest or provide any apparent reason for an induction heater as recited in claim 9.

Since the combination of Clavin and Rossheim may not be relied upon to teach or suggest or provide any apparent reason for each and every element of claim 9, a *prima facie* case of

obviousness may not be established. For at least the foregoing reasons, Appellant respectfully submits claim 9 is separately patentable over the prior art and requests the rejection of claim 9 under 35 U.S.C. §103 as obvious over Clavin and Rosshiem be overturned.

For at least the foregoing reasons, it is respectfully requested that the rejections of claims 1-10 based on 35 U.S.C. §§102 or 103 be overturned.

Respectfully submitted,

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**CERTIFICATE OF TRANSMISSION**

I hereby certify that this correspondence is being submitted electronically via EFS Web to the United States Patent and Trademark Office on August 13, 2007.

Si Vuong

Si Vuong

## **VIII. CLAIMS APPENDIX**

The claims involved in this Appeal are as follows:

1. (Previously Presented) A method of bending Composite Reinforced Pipe (CRP) comprising:

placing a heater proximate to a longitudinal location along the pipe where the pipe is to be bent;  
heating the pipe;  
bending the pipe at the longitudinal location.

2. (Original) The method of Claim 1 wherein the pipe is heated such that a composite temperature is slightly below a heat distortion temperature of the composite.

3. (Original) The method of Claim 1 wherein the pipe is bent incrementally at a plurality of longitudinally displaced locations.

4. (Original) The method of Claim 1 wherein a plurality of bends effect approximately 1° of total bend in a longitudinal length equal to a diameter of the CRP.

5. (Original) The method of Claim 3 wherein the longitudinally displaced locations are separated by a distance equal to approximately 1/4 of a diameter of the pipe.

7. (Original) The method of Claim 1 further comprising:  
preheating the pipe prior to heating the pipe.

8. (Original) The method of Claim 1 further comprising:  
capping the pipe to prevent heat loss.

9. (Original) The method of Claim 1 wherein the heater is an induction heater.

10. (Original) The method of Claim 7 wherein preheating comprises:  
introducing hot air into the CRP.

**IX. EVIDENCE APPENDIX**

There is no evidence submitted herewith.

**X. RELATED PROCEEDINGS APPENDIX**

There are no related proceedings submitted herewith.